CLAIMS

1. A support arm, comprising:

a first strut having a proximal portion pivotally coupled to a proximal link at a first proximal joint;

a distal link pivotally coupled to a distal portion of the first strut at a first distal joint;

a cam coupled to one of the links;

a cam follower contacting a cam surface of the cam at a first contact point;

the cam and the cam follower cooperating to apply a cam moment to the first strut; and

the cam moment being sufficient to balance a load supported by the distal link.

2. The support arm of claim 1, further comprising a means for urging the cam follower against the cam surface of the cam.

3. The support arm of claim 2, wherein the means for urging the cam follower against the cam surface of the cam comprises an energy source.

4. The support arm of claim 3, further comprising an adjustment mechanism for varying an output of the energy source.

5. The support arm of claim 2, wherein the means for urging the cam follower against the cam surface of the cam comprises a spring.

6. The support arm of claim 3, further comprising an adjustment mechanism for varying a characteristic of the spring.

7. The support arm of claim 6, wherein the adjustment mechanism comprises a spring plate coupled to the spring.

8. The support arm of claim 7, wherein the adjustment mechanism comprises a screw for adjusting a position of the spring plate.

9. The support arm of claim 8, wherein the screw threadingly engages a threaded portion of the spring plate.

10. The support arm of claim 1, wherein a strut angle is defined by a longitudinal axis of the first strut and a direction of gravitational pull.

11. The support arm of claim 10, wherein the cam moment varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

12. The support arm of claim 11, wherein the cam moment varies in proportion to a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

13. The support arm of claim 10, wherein a contact angle is defined by a longitudinal axis of the first strut and a tangent line extending through the first contact point.

14. The support arm of claim 13, wherein the tangent line is tangent to the cam surface.

15. The support arm of claim 13, wherein the tangent line is tangent to a follower surface of the cam follower.

16. The support arm of claim 13, wherein the longitudinal axis of the first strut extends through the first proximal joint and the first distal joint.

17. The support arm of claim 13, wherein the longitudinal axis of the first strut extends through a first proximal pivot axis defined by the first proximal joint and a first distal pivot axis defined by the first distal joint.

18. The support arm of claim 10, wherein the cam provides a reaction force supporting the cam follower when the cam follower is urged against the cam.

19. The support arm of claim 18, wherein the cam moment is provided by a moment creating component of the reaction.

20. The support arm of claim 19, wherein the cam is shaped so that the moment creating component of the reaction force varies as the first strut rotates relative to the cam.

21. The support arm of claim 18, wherein the moment creating component of the reaction force varies as a function of the contact angle as the first strut rotates relative to the cam.

22. The support arm of claim 18, wherein the cam is shaped so that the contact angle varies as the first strut rotates relative to the cam.

23. The support arm of claim 22, wherein the cam is shaped so that a trigonometric TAN function of the contact angle varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

24. The support arm of claim 18, wherein the cam is shaped so that a deflection of a spring varies as the first strut rotates relative to the cam.

25. The support arm of claim 24, wherein the deflection of the spring varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

26. The support arm of claim 18, wherein the cam is shaped so that a radius of the cam varies when the first strut rotates relative to the cam.

27. The support arm of claim 26, wherein the cam is shaped so that a radius of the cam varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

28. The support arm of claim 18, wherein the cam is shaped so that a radius of curvature of the cam varies when the first strut rotates relative to the cam.

29. The support arm of claim 28, wherein the cam is shaped so that a radius of curvature of the cam varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

30. The support arm of claim 1, wherein the cam is shaped such that a contact angle of the cam follower changes when the first strut is rotated relative to the cam.

31. The support arm of claim 1, wherein a spring is extended as the first strut rotates so that the first distal joint moves in a downward direction.

32. The support arm of claim 1, wherein a spring is compressed as the first strut rotates so that the first distal joint moves in a downward direction.

33. The support arm of claim 32, wherein the spring comprises a coil spring.

34. The support arm of claim 32, wherein the spring comprises a leaf spring.

35. The support arm of claim 32, wherein the spring comprises an elastomeric material.

36. The support arm of claim 32, wherein the spring comprises a spring selected from the group consisting of: compression springs, extension springs, torsion springs, and constant force springs.

37. The support arm of claim 1, wherein:

the proximal link and the first strut pivot relative to one another about a proximal pivot axis; and the distal link and the first strut pivot relative to one another about a distal pivot axis.

38. The support arm of claim 1, wherein the cam surface has a substantially continually changing slope.

39. The support arm of claim 1, wherein the cam surface has a substantially continually changing radius of curvature.

40. The support arm of claim 1, wherein the cam has a substantially continually changing radius.

41. The support arm of claim 1, further including a second strut having a proximal portion pivotally coupled to the proximal link at a second proximal joint and a distal portion pivotally coupled to the distal link at a second distal joint.

42. The support arm of claim 41, wherein the first strut, the second strut, the proximal link, and the distal link form a parallelogram.

43. A support arm, comprising:

a first strut having a proximal portion pivotally coupled to a proximal link at a first proximal joint;

a distal link pivotally coupled to a distal portion of the first strut at a first distal joint;

a cam coupled to the first strut;

a cam follower contacting a cam surface of the cam at a first contact point;

the cam and the cam follower cooperating to apply a cam moment to the first strut; and

the cam moment being sufficient to balance a load supported by the distal link.

44. The support arm of claim 6, wherein the adjustment mechanism varies a pre-load of the spring.

45. The support arm of claim 6, wherein the adjustment mechanism varies an angle of the spring.

46. The support arm of claim 6, wherein the adjustment mechanism varies a length of the spring.